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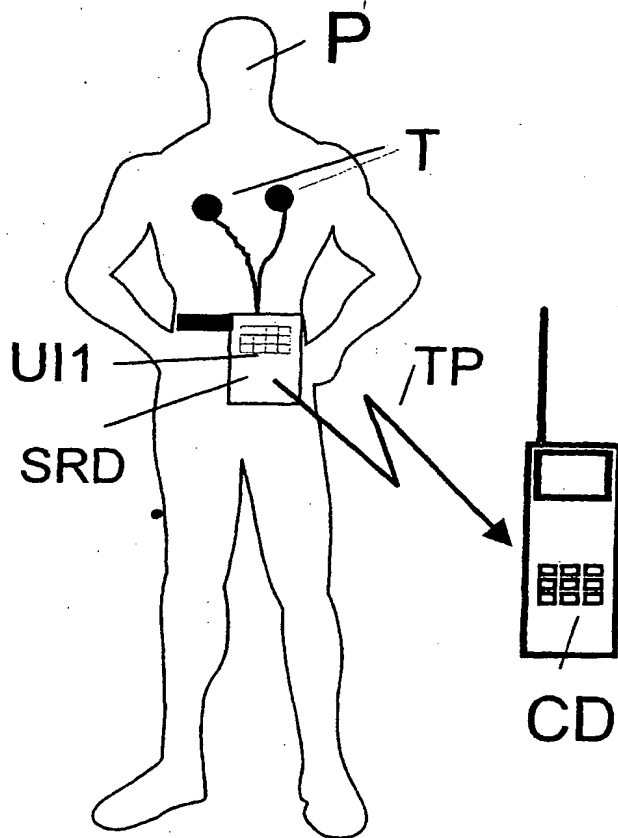
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: ARRANGEMENT FOR CALLING EXPERT SERVICE



(57) Abstract: The present invention relates to an arrangement to produce expert services such as health and medical services to be realized in such a manner that user (P) registers with suitable means (SRD) signals, which are transmitted via suitable communication means (CD), such as phone, e.g. mobile phone using telecommunication network (TCS) to service unit selected by P, such as personal databank (PDB) of P or to automatic analyzing system (ADA) or direct to professionals (PA).

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## ARRANGEMENT FOR CALLING EXPERT SERVICE

5 The present invention relates to an arrangement to produce expert services such as health and medical services using telecommunication services and systems.

10 The production of health and medical is under constant pressure for changes due to customer demands and progress in medical science. Furthermore, the cost development must be kept within limits because it is obvious that the available allowances will continuously become smaller or at least will not markedly grow. Data communication networks make the production of new services with moderate costs and high efficiency possible. A prerequisite to the economic production of these services is that one may effectively service a large number of customers with a small staff. This staff can be located in certain centers or distributed in different  
15 locations. The efficient use of telenetworks is essential.

For example in publication US5772586 an arrangement has been described to the monitoring of the patient's health using telecommunication system, among others, a mobile phone with its accessories. The weakness of this arrangement is mainly its ineffectiveness due to the demand for large personnel.

20 The publication US5415167 shows an automatic diagnostic device, which monitors outer dimensions of a selected organ of the body, if in these a significant deviation takes place, an alarm will be transmitted via a telecommunication system. This kind of equipment may be used only in some special cases.

25 The publication US4981139 shows an equipment based on microprocessor technology. The equipment, which registers several signals from the human body, and if deviations in these exceed set limits, the equipment performs an alarm with the help of an infrared light transmitter. This alarm can be transferred also to telecommunication networks.

30 The following publications are mentioned as a background material and they represent the present level of the technology. The solutions presented do not meet the effectiveness demand or are difficult to use in practice. The publications contain so-

lutions, which can also be utilized in connection with the present invention. Representing the level of the technique following publications are listed:

US5003984, US5257627, US5289824, US5390238, US5902234, US5827180,  
US5781442, US5594786, US5737396, US593179, US4967756, US4120294,  
5 US4531527, US4883064, US5038800, US4736295, US5553609 and US5623925.

The application of telemedicine should fulfill following requirements:

- 1) The application is unquestionably useful to the user and improves results of care or promotes efficient diagnostics of illnesses or pathologic conditions
- 10 2) The required user-specific investments are small.
- 3) The required staff is small with respect to the impact of results.
- 4) The use of the system is simple and reliable.
- 5) The use of services can be documented for later use and the documentation may be utilized, among others, in billing.

15 It is possible with the arrangement of the invention to meet the demands that have been described above and to carry out, among others, efficient telemedicine service e.g. in diagnosis of heart related conditions, in monitoring of a condition of a patient and in follow up and managing of treatment.

20 Objects of the invention are accomplished by what is set forth in more detail in claim 1 and in the subclaims.

The invention is described in following with reference to the attached drawings, wherein:

Figure 1 shows an arrangement of the present invention. The example is related to  
25 an application in the health service but a similar arrangement can be adapted for example to a service of equipments.

Figure 2 shows an arrangement of the present invention, related to telecommunications and service system

Figure 1 shows a solution of the present invention, in which the user P (patient)  
30 has a signal registration device SRD (signal registration device), which as shown in the figure can be fixed on a belt and which registers the signals from the sensors, T (transducer). T can be in contact with the user, P or T can be based on taking

a sample, such as for example the sensor to measure sugar level of blood. there may be one or more sensors T. These may be related to the registration of same signal or quantity, such as ECG, or to several different signals or quantities, such as to the registration of ECG and blood pressure. SRD includes means for registration of signals, such as amplifiers or filters, which can be carried out using analog or digital technology and they may be fixed by parameters, or adjustable, or adaptive. Furthermore, SRD can contain to record and store signals and time. SRD may include GPS based localization means to state the place of the signal registration. Furthermore, SRD may include means for registration of some external quantities such as air pressure and temperature. It should be still mentioned that some sensors T may be used to register physical activity, such as walk pace of P,. Additionally, SRD includes a user interface UI (user interface) through which P can control SRD. Especially P may start through UI a registration of one or all of the signals. Such a use is necessary for example in cases where one wants to diagnose a potential cardiac pathology in P based on detection of extrasystoles. In that case P will start registration on the basis of symptoms, this kind of symptoms may be dizziness or chest pain. Furthermore, SRD can record chosen signals continuously and under control of P signals already registered within the first period before start command and the second time period after the start command is recorded in the memory means. This way the signals may be registered from the temporal surroundings of the event. A device like this is often called an event recorder. Also SRD can contain internal signal analysis means to detect deviations and to generate the saving command automatically. This kind of a deviation can be a deviation that has been detected by SRD in the ECG signal, and SRD automatically generates saving command. UI may include display or signaling means with which SRD notifies the user for example registration of an event or low battery or time to transfer the registered data to the service center. For this transfer SRD contains means to transfer information through a telecommunication network. This may be, according to figure 1, a data transfer connection TP between SRD and communication device CD (communication device) such as mobile phone. TP can be for example a cable connection, or wireless connection, such as a radio frequency, inductive, capacitive or infrared connection. As an advantageous radio fre-

quency connection one must mention so called Blue Tooth solution, which is becoming a standard for short distance cordless connections. CD contains devices and software that are needed in the data transfer. These can be in equipments manufactured in large series and they can also be used for other communications and data transfer. Thus an arrangement of the invention does not require any changes in communication device CD which may be manufactured in large series. This is an important step towards a solution with high cost efficiency.

P set up a connection via CD through telenetwork TCS (telecommunication system) to the service, which he will use. As an example, a service shown in figure 2 is divided in three categories. From these categories, DB (DataBase) is a personal data bank, in which P may time to time store some personal information, such as signals registered by SRD. The information in DB he may use either for management of fitness activities or of treatment. The information in DB may be analyzed also automatically with the means for automatic analysis ADA (automatic data analysis) included in the system or this analysis may be participated by professionals of the service PA (professional adviser. PA can include doctors, nurses or corresponding professionals or groups of professionals required by the service. Results of analysis are to be stored in DB, which is dedicated personally to P, and they can be utilized later. Furthermore, ADA can contact P automatically based on the results and with a text and/or with synthesized speech may advise P to carry out the necessary measures. Such measures are for example a request to repeat a registration that has been found to be faulty or a suggestion to make contact the nearest hospital. The necessary contact information ADA gets from localization information, which a GPS, or a similar localization unit included in SRD or CD has sent. It is also essential that to the information processing system and service system of P, only P and other authorized persons have user rights, and licenses to use them also can be limited conveniently. For this reason, the system contains identification means, which can be based for example on passwords or on utilization of biometric information as of fingerprint.

ADA also can inform PA automatically to contact P. This kind of a situation can be created if ADA detects a serious deviation, such as dangerous arrhythmia in registered ECG signal of P.

ADA can be devised also so that it will utilize in analysis the information stored in a general databank (general data base). The databank will be updated continuously and it may be utilized in the evaluation of the signals of P. This analysis performed by ADA may be based on neural networks and fuzzy logic. GDB contains for example the information, which continuously is to be collected from numerous users, P. This information is conveniently classified for example according to age, sex, illnesses etc.

P also may, if necessary, contact directly to PA. This situation may such as for example if there are difficulties in the registration of signals or quantities or if the attack got by P seems so serious that, the analysis of signals and the drawing of the conclusions are to be done immediately.

The advantages of the arrangement, which is in accordance with the invention, are the following:

1. The user P may choose the level of service which is in accordance with his need: for example storing of signals for analysis, which will later take place and for reference use or he can choose on-line signal analysis performed by ADA. ADA can recommend the necessary measures, automatically, for example a making of a direct connection to PA. Furthermore, P may choose a direct contact to PA for example in a problematic situation. In that case, he will get an immediate response and a personal guidance.
2. The services can be priced according to the level of the service: the recording to an own databank is the least costly service, on-line automatic analysis is more expensive and a direct contact to PA is the most expensive. From the use the producer of the service can make a report, which may be used, among others, in connection with insurance applications.
3. Automatic analysis service ADA may be based on the best level of the technique known at that time, because the investment is divided between numerous users. ADA also can utilize continuously the accumulating experience information, which is recorded in a general databank GDB. This improves the quality of service continuously.
4. Because majority of the contacts and signal analysis is performed automatically, the necessary number of persons of PA remains moderate. These do

not need to be located in the same central unit physically either, but the persons of PA can be geographically located very far off from each other indeed and communicate through data networks. In problematic situations the experts can communicate and negotiate via telenetworks.

- 5 5. The localization information produced by the system allows a quick guidance of P to the nearest hospital to that the necessary patient history with recommendations of therapy can be delivered through the data networks. At the same time, the hospital can be informed about the scope of the health insurance of P.

10

It should be mentioned that the system, which is in accordance with the invention, could be adapted also for the production of the maintenance services of complex devices. P can then be for example a car, a paper machine, a copying machine or an airplane.

15

The invention is not limited to the above embodiments but a plurality of modifications can be considered plausible within the scope of the annexed claims.

## PATENT CLAIMS

1. Arrangement for realization of expert service, such as health care related  
telemedicine service c h a r a c t e r i z e d by that the user P registers with  
5 suitable signal registration means (SRD) signals which are to be transmitted  
via suitable means of communication (CD), such as telephone for example  
mobile phone, through a data transfer network (TCS) to service unit selected  
by P, to such as personal databank of P (PDB) or to automatic analysis system  
(ADA) or directly to expert (PA).
- 10 2. Arrangement of claim 1 c h a r a c t e r i z e d by that signal registration means  
(SRD) is with suitable communication paths and at suitable times in contact  
with means of communication (CD), such communication paths are for exam-  
ple wireless radiofrequency contact, one example of which is so called Blue  
15 Tooth, infrared contact, sound, especially ultrasound contact or cable contact.
3. Arrangement set forth in any of the claims above c h a r a c t e r i z e d by that  
signal registration means (SRD) stores selected signals in temporal vicinity of  
certain event, such an event may be a deviation in signals or command given  
20 by user (P).
4. Arrangement set forth in any of the claims above c h a r a c t e r i z e d by that  
signal registration means (SRD) and/or means of communication (CD) in-  
cludes unit with contact with some localization system such as GPS or is at  
25 least in contact with such an unit and obtained localization information is util-  
ized when service is provided to user (P).
5. Arrangement set forth in any of the claims above c h a r a c t e r i z e d by that  
billing related to services takes place depending on the use of services and ar-  
30 rangement delivers a report on that when required.



6. Arrangement set forth in any of the claims above characterized by that signal registration means (SRD) includes memory means to store selected signals.
- 5 7. Arrangement set forth in any of the claims above characterized by that means to perform automatic analysis of signals (ADA) may be in contact with user (P) and experts (PA).
- 10 8. Arrangement set forth in any of the claims above characterized by that means to perform automatic analysis of signals (ADA) may utilize information obtained earlier, which is stored for example in general data bank (DB).
- 15 9. Arrangement set forth in any of the claims above characterized by that user rights are based on identification information, which may be obtained from identification numbers, such as serial numbers of machines or from biological information, such as fingerprints and arrangement includes means and software for this purpose.
- 20 10. Arrangement set forth in any of the claims above characterized by that at least some of the signals to be registered are related to function of heart, such as ECG and blood pressure.
- 25 11. Arrangement set forth in any of the claims above characterized by that means to perform automatic analysis of signals (ADA) is analyzing signals utilizing at least partially neural networks or fuzzy logic.

1 / 2

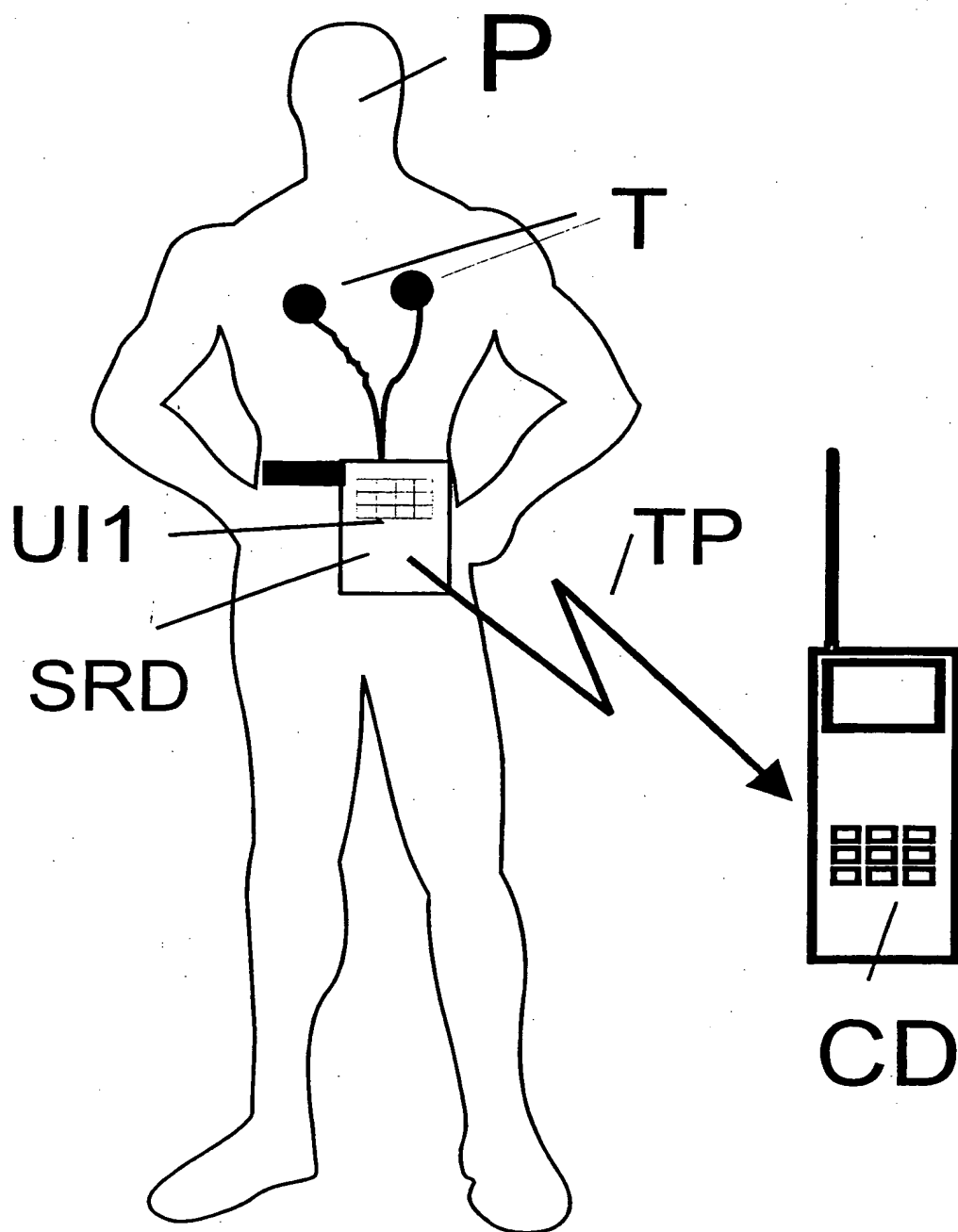


FIG. 1

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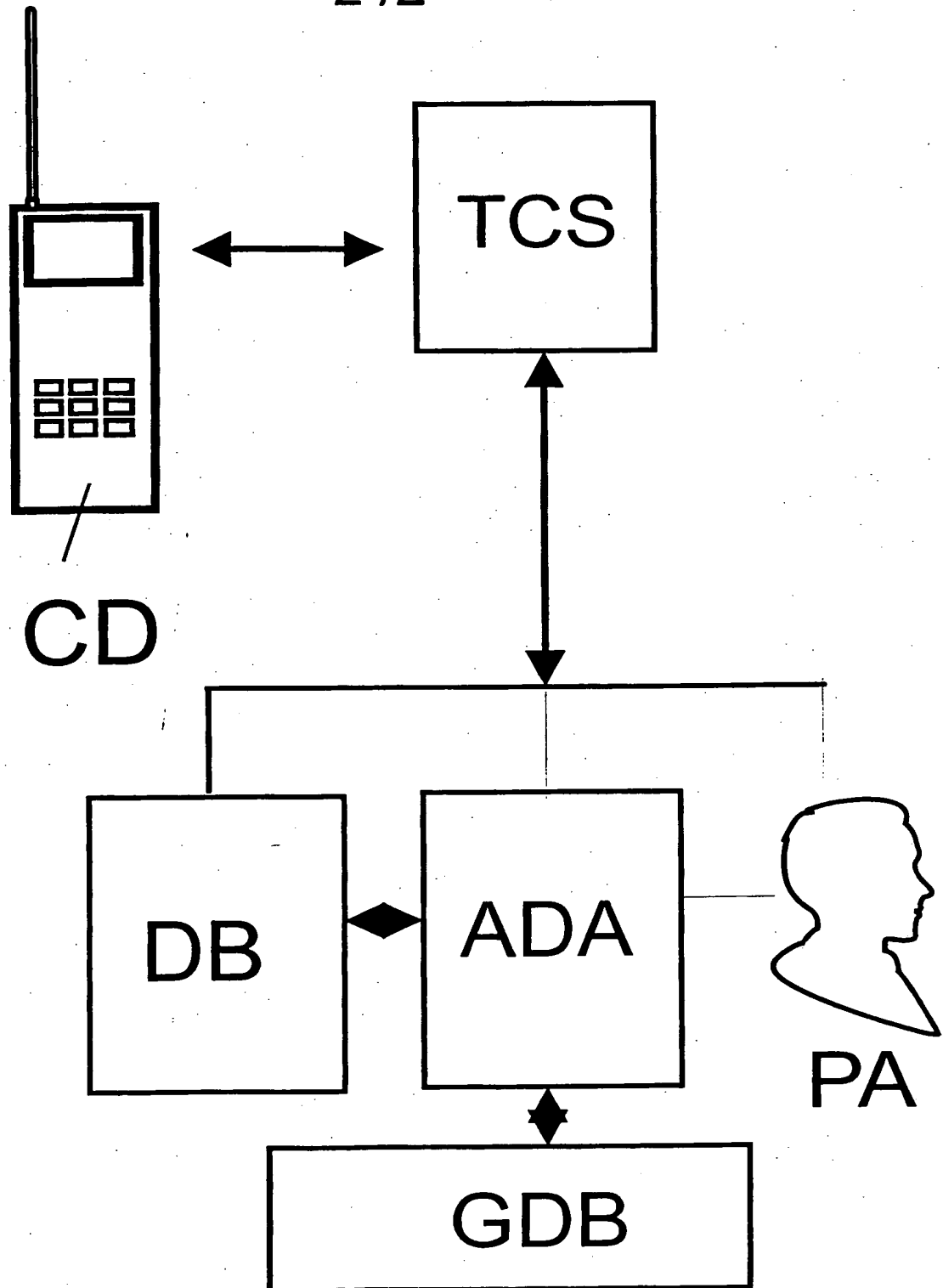


FIG 2

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 00/00719

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G06F 19/00, A61B 5/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A61B, G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0918423 A2 (NOKIA MOBILE PHONES LTD.), 26 May 1999 (26.05.99), column 3, line 51 - column 6, line 42, figures 1,2	1-10
Y	--	11
Y	US 5092343 A (R. SPITZER ET AL.), 3 March 1992 (03.03.92), abstract	11
X	WO 9838611 A1 (RAIMUNDERBEL ET AL.), 3 Sept 1998 (03.09.98), page 1, line 1 - page 3, line 22; page 4, line 14 - line 24, figures 1,2, abstract	1-10

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

### \* Special categories of cited documents

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier application or patent but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

\*&\* document member of the same patent family

Date of the actual completion of the international search

4 January 2001

Date of mailing of the international search report

10-01-2001

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 00/00719

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 9811820 A1 (SVENSKA TELEMEDICIN SYSTEM AB), 26 March 1998 (26.03.98), page 3, line 21 - page 7, line 17, figure 1, abstract --	1-3,5-10
X	WO 9824212 A1 (MICROMEDICAL INDUSTRIES LIMITED), 4 June 1998 (04.06.98), page 1, line 1 - page 4, line 13, abstract -----	1-3,5-10

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 00/00719

## Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☒ Claims Nos.: 1-11 (in parts)  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:  
See extra sheet.
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.  
☐ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/FI 00/00719

Patent document cited in search report			Publication date	Patent family member(s)		Publication date
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				SE	513506 C	25/09/00
				SE	9603429 A	13/05/98
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WO	9824212	A1	04/06/98	AU	5111398 A	22/06/98
				AU	P0394396 D	00/00/00
				AU	P0455397 D	00/00/00

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